



Product Safety Assessment

Spinosad

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Names

- Spinosad (a mixture of spinosyn A and spinosyn D)
- Spinosyn A
- CAS No. 131929-60-7
- 2-((6-Deoxy-2,3,4-tri-O-methyl- α -L- mannopyranosyl)oxy)-13-((5-(dimethylamino)tetrahydro-6-methyl-2H- pyran-2-yl)oxy)-9-ethyl-2,3,3a,5a,5b,6,9,10,11,12,13,14,16a,16b- tetradecahydro-14-methyl-1H-as- indaceno(3,2-d)oxacyclododecin-7,15- dione (IUPAC)
- Spinosyn D
- CAS No. 131929-63-0
- 2-((6-Deoxy-2,3,4-tri-O-methyl- α -L- mannopyranosyl)oxy)-13-((5-(dimethylamino)tetrahydro-6-methyl-2H- pyran-2-yl)oxy)-9-ethyl-2, 3,3a,5a,5b,6,9,10,11,12,13,14,16a,16b- tetradecahydro-4, 14-dimethyl-1H-as- indaceno(3,2-d)oxacyclododecin-7, 15- dione (IUPAC)

Trade Names

- Audienz™ insect control
- Biospin™ insect control
- Boomerang™ insect control
- Caribstar™ insect control
- Conserve™ SC turf and ornamental insect control
- Entrust™ Naturalyte® insect control
- Flipper™
- GF-120™ NF Naturalyte fruit fly bait
- Laser™ insect control
- Mozkill™ insect control
- Musdo Gold™ insect control
- Naturalure™ Naturalyte fruit fly bait
- Spinoace™ insect control
- SpinTor™ 2SC Naturalyte insect control
- Success™ Naturalyte insect control
- Syneis™ Appat Insect Control
- Tracer™ Naturalyte insect control

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Product Overview

- Spinosad is the active ingredient in a series of insecticide products formulated by Dow AgroSciences, a wholly owned subsidiary of The Dow Chemical Company. Spinosad is formulated using various formulation technologies such as a suspension concentrate (SC), water dispersible granule (WG), wettable powder (WP), bait concentrates and numerous solid insect baits. Liquid formulations have solid spinosad in suspension in [propylene glycol](#) (CAS# 57-55-6). Spinosad-containing formulations are sold under many trade names around the globe such as Audienz™, Biospin™, Boomerang™, Caribstar™, Conserve™ insect

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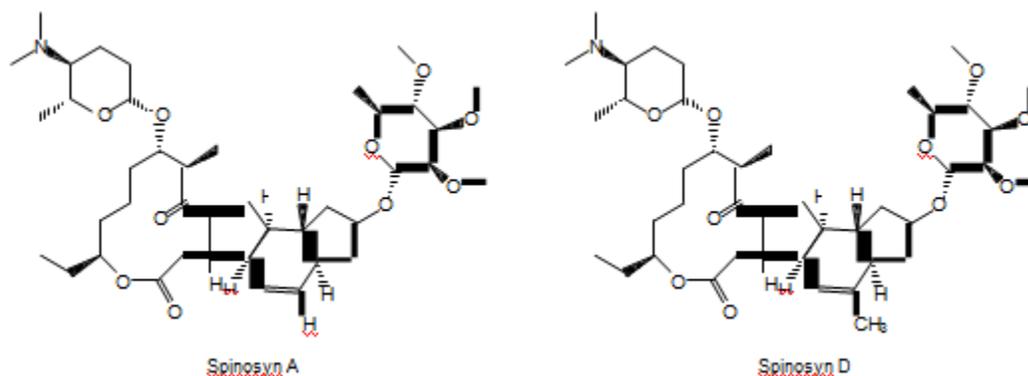
control, Entrust™ insect control, Flipper, GF-120™ NF Naturalyte™ Fruit Fly Bait, Laser, Mozkill™, Musdo Gold*, Naturalure™ Naturalyte™, SpinTor™ insect control, Success™ insect control, Syneis™ and Tracer™ insect control. Spinosad was accepted for review and registered under the U.S. Environmental Protection Agency (EPA) Reduced Risk Pesticide Program^{1,2,3} and was designated by the EPA as the 2000 Presidential Green Chemistry Challenge winner for Designing Greener Chemicals Award (<http://www2.epa.gov/green-chemistry/presidential-green-chemistry-challenge-winners>).

- Spinosad is a broad-spectrum insecticide used to control Lepidoptera larvae (caterpillars), Diptera (flies), Thysanoptera (thrips), Coleoptera (beetles) and many other crop-damaging pests. Spinosad is registered for use in over 82 countries for more than 250 crops including uses in turf, tree farms, ornamental plants and trees, plantations, greenhouses, commercial aquatic plants, and control of fire ants.^{4,5} See [Product Uses](#).
- Spinosad is certified by USDA National Organic Standards Board, Mayacert, BCS Öko- Garantie GmbH, and others; certain formulations are listed for use by the Organic Materials Research Institute (OMRI) for organic use in the US and various other countries.
- Eye contact with spinosad in powder formulations may cause slight irritation or pain disproportionate to the level of irritation to eye tissues, but corneal injury is unlikely. Eye contact with spinosad liquid formulations may cause slight temporary irritation. Prolonged skin contact with spinosad may cause slight irritation with local redness and is not likely to result in absorption of harmful amounts. Inhalation of spinosad vapor from powder formulations is unlikely. Prolonged inhalation of spinosad liquid formulations is not expected to cause adverse effects.^{2,3} See [Health Information](#).
- Occupational exposure to spinosad could occur in manufacturing or formulating operations during maintenance, sampling, testing, or other procedures. Agricultural workers or groundskeepers could be exposed during field application. Workers using spinosad must wear proper protective equipment and follow label instructions carefully. Consumers could be exposed from dietary sources (food and drinking water), contact with treated turf or nursery stock, or home use of spinosad insecticides.⁶ See [Exposure Potential](#).
- Spinosad is stable at typical use and storage temperatures.^{2,3} See [Physical Hazard Information](#).

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Manufacture of Product

- **Process** – Spinosad is manufactured at a Dow AgroScience's facility using a fermentation process in which *Saccharopolyspora spinosa* colonies are grown using natural products such as soybean and cottonseed meal. The chemical structures of spinosyn A and spinosyn D, the two components of spinosad, are shown below.



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Product Description¹

Spinosad is the active ingredient in series of insecticide products formulated by Dow AgroSciences LLC, a subsidiary of The Dow Chemical Company. Spinosad is a mixture of spinosyn A and spinosyn D, two naturally occurring metabolites from the soil bacterium, *Saccharopolyspora spinosa*. Spinosad is formulated as a solid or liquid. These formulations are sold under the trade names Conserve™ insect control, Entrust™ insect control, Flipper, GF-120™ Success™ insect control and Tracer™ insect control. Liquid formulations have various concentrations of the solid spinosad in suspension in Liquid and certain solid spinosad formulations are typically mixed with water and applied to foliage as a spray. Because of its high efficacy, use rates for spinosad are generally low, in the ounces per acre or grams/hectare range. Spinosad has contact activity on virtually all life stages of a pest including egg, larvae and adult. Eggs must be sprayed directly but larvae and adults can be effectively dosed through contact with treated surfaces. Spinosad is most effective when eaten by insect pests. Foliar formulations of spinosad are not highly systemic, however, translaminar activity is evident

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in some crops. In general, more movement and penetration is seen with younger and rapidly growing leaves. Limited root uptake may also occur under certain conditions and environments. Spinosad residue on plant foliage appears to be harmless to foraging honeybees once dry and has minimal impact on most other beneficial insects. Under labeled use patterns, phytotoxicity is not a concern with spinosad.

Spinosad was accepted for review and registration under the U.S. Environmental Protection Agency (EPA) Reduced Risk Pesticide Program. Spinosad is classified as an organic substance by the USDA National Organic Standards Board.

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Product Uses^{4,5}

Applications for spinosad insecticide include:

- **Commercial crops**—control of crop-damaging pests such as Lepidoptera larvae (worms or caterpillars), leafminers, fruit flies, leaf-chewing beetles, thrips, and others. Spinosad is used globally on more than 250 crops encompassing most of the crop groupings such as **row crops**, e.g. cotton, soybean, rice; **tree fruits**, e.g. pome, stone and citrus; **tree nuts** e.g. walnut, almond; **small fruits**, e.g. grape, strawberry; **leafy and brassica vegetables**, e.g. lettuce, cole crop; **fruiting vegetables**, e.g. tomato, pepper; **curcurbits**, e.g. cucumber, melon; **bulb, root and tuber vegetables**, e.g. onion, carrot, potato; **legumes**, e.g. dry and succulent peas and beans; **forages**, e.g. alfalfa, forage grasses and pastures; **other**; e.g. coffee, tea, plantation
- **Turf and ornamental**—turf, trees, and ornamentals in nurseries and greenhouses, and commercial aquatic plants
- **Stored grain**
- **Fire ant control**
- **Home and garden uses**

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Exposure Potential

Based on the uses for spinosad, the public could be exposed through:

- **Workplace exposure** – Exposure can occur in a spinosad manufacturing facility or facilities using spinosad to formulate insecticide products. Workers could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing and formulating facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary exposure. Agricultural workers and groundskeepers could be exposed to spinosad during field application. Wearing proper protective equipment and following label instructions will reduce exposure risk.^{4,5} See [Health Information](#).
- **Consumer exposure to products containing spinosad** – Consumers could be exposed to spinosad from dietary sources (food and water), contact with treated turf or nursery stock, or from home use of spinosad products. Spinosad exposure has been evaluated by the U.S. Environmental Protection Agency (EPA) among other regulatory authorities. The EPA evaluated combined dietary and residential exposure risk, both short term and long term, as well as aggregate cancer risk. Based on these risk assessments, the EPA concludes that “there is reasonable certainty that no harm will result to the general population and to infants and children from aggregate exposure to spinosad residues.”
- **Environmental releases^{2,3}** – For small spills of spinosad powder, sweep up the material and place it in a container suitable for disposal. For a small liquid spill of spinosad, use a non-reactive absorbent such as sand, sawdust, or dirt. Collect the material in a container suitable for disposal. Wash exposed body areas thoroughly after handling. Consult the relevant [\(M\)SDS](#) or product label for more information about protective equipment and procedures. See [Environmental, and Physical Hazard Information](#).
- **Large release** – In the event of a large liquid spill of spinosad, dike spill area to prevent the material from reaching sewers, drains, streams, or waterways. Personnel engaged in clean up of spills should wear appropriate protective equipment. Apply nonreactive absorbent material such as earth or sand. Collect material and contain in appropriate containers for disposal. Report large spills to Dow AgroSciences at 800-992-5994. Consult the relevant [\(M\)SDS](#) or product label for more information about protective equipment and procedures.

In case of fire, self-contained breathing apparatus (SCBA) and full protective clothing must be worn. Isolate the area and deny unnecessary entry. Fight fire with foam, carbon-dioxide, dry-chemical, or water-fog fire extinguishers. Do not allow water from fire-fighting to enter water supplies or drainage systems. Consult the [\(M\)SDS](#).

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Health Information^{2,3}

Eye and Skin Contact—Eye contact with spinosad in powder formulations may cause slight irritation or pain disproportionate to the level of irritation to eye tissues. The dust may irritate eyes, but corneal injury is unlikely. Eye contact with spinosad liquid formulations may cause slight temporary irritation. Prolonged skin contact with spinosad formulations may cause slight irritation with local redness, although it is not likely to result in absorption of harmful amounts.

Ingestion—Spinosad has very low toxicity if swallowed.

Inhalation—In solid formulations, inhalation of spinosad vapor is unlikely due to the material's physical properties. Prolonged inhalation of spinosad liquid formulation is not expected to cause adverse effects.

Cancer and Birth Defect Information—Spinosad did not cause cancer in laboratory animals. In laboratory studies, Spinosad did not cause birth defects, although dystocia was observed at high (not environmentally relevant) dose rates. For specific health information, review the [\(M\)SDS](#).

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Environmental Information^{2,3}

The bioconcentration potential for spinosad is low, meaning spinosad is not likely to accumulate in the food chain. Spinosad is highly toxic to marine mollusks on an acute basis and slightly to moderately toxic to fish on an acute basis. Spinosad is practically nontoxic to birds on an acute and dietary basis. Based on Organization for Economic Cooperation and Development (OECD) test guidelines, spinosad is not considered to be readily biodegradable. However, spinosad does degrade from exposure to sunlight (photolysis) and microbial breakdown in the soil.

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Physical Hazard Information^{2,3}

Spinosad is stable under normal use and storage conditions.

Additional physical hazard information for spinosad is available on the [\(M\)SDS](#).

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Regulatory Information

Regulations exist that govern the manufacture, sale, transportation, use, and/or disposal of spinosad. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [\(M\)SDS](#).

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Additional Information

- Safety Data Sheet (<http://www.cdms.net/labelsmsds/lmdefault.aspx>).
- Dow AgroSciences website: (<http://www.dowagro.com>).
- *Spinosad Technical Bulletin*, Dow AgroSciences LLC, Form No. Y45-000-001 (01/01) CBK
- *Conserve[®] SC Turf and Ornamental Insect Control Specimen Label*, Dow AgroSciences LLC, (<http://www.cdms.net/labelsmsds/lmdefault.aspx>).
- *Entrust[™] Naturalyte[™] Insect Control Specimen Label*, Dow AgroSciences LLC, (<http://www.cdms.net/labelsmsds/lmdefault.aspx>).
- *Spinosad Pesticide Tolerance*, U.S. Environmental Protection Agency, *Federal Register* Docket ID No. DOCID:fr21mr07-4, 72 Fed. Reg. 13168 (Mar. 21, 2007)
- *Spinosad Pesticide Tolerance*, U.S. Environmental Protection Agency (http://www.ecfr.gov/cgi-bin/text-idx?SID=e5b7eacd89ec4b281fd9ee4f505f014f&node=se40.24.180_1495&rgn=div8)
- Thompson, Gary D., Hutchins, Scott H., Sparks, Thomas C., Dow AgroSciences LLC, *Development of Spinosad and Attributes of a New Class of Insect Control Products*, Radcliff's IPM World Textbook Website, University of Minnesota, January 23, 1999, (<http://ipmworld.umn.edu/chapters/hutchins2.htm>).

For more business information about spinosad, visit the [Dow AgroSciences](#) website: <http://www.dowagro.com/>.

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References

- ¹ *Spinosad Technical Bulletin*, Dow AgroSciences LLC, Form No. Y45-000-001 (01/01) CBK
- ² *Entrust™ Naturalyte™ Insect Control Material Safety Data Sheet*, Dow AgroSciences LLC, MSDS: 007516
- ³ *Conserve™ SC Turf and Ornamental Insect Control Material Safety Data Sheet*, Dow AgroSciences LLC, MSDS:005864
- ⁴ *Conserve™ SC Turf and Ornamental Insect Control Specimen Label*, Dow AgroSciences LLC, Label Code: D02-090-010, EPA Reg. No. 62719-291
- ⁵ *Entrust™ Naturalyte™ Insect Control Specimen Label*, Dow AgroSciences LLC, Label Code: D02-184-006, EPA Reg. No. 62719-282
- ⁶ *Spinosad Pesticide Tolerance*, U.S. Environmental Protection Agency, *Federal Register* Docket ID No. DOCID:fr21mr07-4, *Federal Register*. March 21, 2007 (Volume 72, Number 54), Rules and Regulations pages 13170–13171.

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NOTICES

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